

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A method for detecting ringback in a received signal, said method comprising:

- ~~a. calculating a current value of signal energy the energy of said received signal;~~
- ~~b. calculating a threshold based on said energy in said received signal;~~
- determining a current ringback detection threshold from the current value of signal energy;
- comparing the current ringback detection threshold to a previous ringback detection threshold and selecting one of them as an adaptive ringback detection threshold;
- ~~e. determining whether ringback is present in said received signal by comparing said current value of signal energy in said received signal to said adaptive ringback detection threshold; and~~
- storing the adaptive ringback detection threshold as the previous ringback detection threshold for use in a next comparison of current and previous ringback detection thresholds; and
- ~~f. outputting a control signal indicating whether ringback is present in said received signal.~~

2. (Currently Amended) The method of claim 1 further comprising setting said adaptive ringback detection threshold to an initial value at the start of a call and adjusting said adaptive ringback detection threshold ~~upwardly~~ based on said current value of signal energy of said received signal.

3. (Original) The method of claim 1 wherein outputting a control signal comprises changing said control signal to a first state indicative of no ringback to a second state indicative of ringback when ringback is detected.

4. (Original) The method of claim 3 wherein changing said control signal further comprises changing said control signal from said second state indicative of ringback to said first state indicative of no ringback when ringback is no longer detected.
5. (Original) The method of claim 4 further including maintaining said control signal in said second state for a predetermined period of time after ringback is no longer detected before changing to said first state.
6. (Original) The method of claim 1 further comprising using said control signal to control an audio processing circuit.
7. (Original) The method of claim 6 wherein using said control signal to control an audio processing circuit comprises freezing an adaptive algorithm within said audio processing circuit when ringback is detected.
8. (Original) The method of claim 7 wherein said adaptive algorithm is a voice activity detector.
9. (Original) The method of claim 7 wherein said adaptive algorithm is an acoustic echo canceller.
10. (Original) The method of claim 7 wherein said adaptive algorithm is a network echo canceller.
11. (Original) The method of claim 7 wherein said adaptive algorithm is a noise estimator.

12. (Original) The method of claim 7 wherein said adaptive algorithm is a channel gain estimator.
13. (Original) The method of claim 7 wherein said adaptive algorithm is a noise suppressor.
14. (Original) The method of claim 5 wherein using said control signal to control an audio processing circuit comprises changing the operating mode of said audio processing circuit.
15. (Original) The method of claim 14 wherein said audio processing circuit is a residual echo suppressor and whereon said control signal is used to place said residual echo suppressor in a bypass mode.
16. (Currently Amended) A ringback detector comprising:
 - a.—an energy calculator to calculate a current value of signal energy ~~the energy~~ of a received signal;
 - b.—a threshold calculator configured to calculate a current ringback detection threshold based on said current value of signal energy and to select one of the current ringback detection threshold and a previous ringback detection threshold as an adaptive ringback detection threshold based on a comparison between said current ringback detection threshold and said previous ringback detection threshold ~~calculated energy of said received signal; and~~
 - c.—a comparator to compare said current value of signal energy to the adaptive ringback detection threshold to determine whether ringback is present in the received signal ~~calculated energy of said received signal to said ringback threshold~~ and to generate a control signal indicative of ringback based on said comparison.

17. (Original) The ringback detector of claim 16 wherein said control signal output from said comparator assumes a first state indicative of no ringback when ringback is not detected and assumes a second state indicative of ringback when ringback is detected.

18. (Original) The ringback detector of claim 17 further comprising a hang-time element to delay for a predetermined period after ringback is no longer detected the change of said control signal from said second state indicative of ringback to said first state indicative of no ringback.

19. – 23 (Cancelled)

24. (Currently Amended) A communications terminal comprising:

~~a.~~ a receiver for receiving signals transmitted from a remote location;

~~b.~~ an audio processing circuit to process audio signals contained in said received signal;

and

~~c.~~ a ringback detector to determine whether ringback is present in said received signal ,
said ringback detector including:

~~1.~~ an energy calculator to calculate a current value of signal energy ~~the energy~~
of a received signal;

~~2.~~ a threshold calculator configured to calculate a current ringback detection
threshold based on said current value of signal energy and to select one
of the current ringback detection threshold and a previous ringback
detection threshold as an adaptive ringback detection threshold based on
a comparison between said current ringback detection threshold and said
previous ringback detection threshold ~~calculated energy of said received~~
signal; and

3.—a comparator to compare the current value of signal energy to the adaptive ringback detection threshold to determine whether ringback is present in the received signal ~~said calculated energy of said received signal to said ringback threshold~~ and to generate a control signal indicative of ringback to control said audio processing circuit.

25. (Original) The communications terminal of claim 24 wherein said audio processing circuit includes a voice activity detector.

26. (Original) The communications terminal of claim 24 wherein said audio processing circuit includes an acoustic echo canceller.

27. (Original) The communications terminal of claim 24 wherein said audio processing circuit includes a network echo canceller.

28. (Original) The communications terminal of claim 24 wherein said audio processing circuit includes a noise estimator.

29. (Original) The communications terminal of claim 24 wherein said audio processing circuit includes a channel gain estimator.

30. (Original) The communications terminal of claim 24 wherein said audio processing circuit includes a noise suppressor.

31. (Original) The communications terminal of claim 24 wherein said audio processing circuit includes a residual echo suppressor.

32. (New) The method of claim 1 wherein determining the current ringback detection threshold comprises:

filtering said current value of signal energy to determine a filtered energy;
filtering said previous ringback detection threshold to determine a filtered threshold; and
combining said filtered energy and said filtered threshold to calculate the current ringback detection threshold.

33. (New) The ringback detector of claim 16 wherein said threshold calculator comprises:

a filter circuit configured to calculate the current ringback detection threshold by
combining a filtered version of said current value of signal energy with a filtered version of said previous ringback detection threshold; and
a comparison circuit configured to compare the previous ringback detection threshold and the current ringback detection threshold to select the adaptive ringback detection threshold.

34. (New) The communications terminal of claim 16 wherein said threshold calculator comprises:

a filter circuit configured to calculate the current ringback detection threshold by
combining a filtered version of said current value of signal energy with a filtered version of said previous ringback detection threshold; and
a comparison circuit configured to compare the previous ringback detection threshold and the current ringback detection threshold to select the adaptive ringback detection threshold.

35. (New) A method of detecting ringback in a received signal, said method comprising:

initializing an adaptive ringback detection threshold to an initial value;
detecting whether ringback is present in the received signal by comparing a signal energy calculated in each of one or more successive frames of the received signal to the adaptive ringback detection threshold; and
adapting the adaptive ringback detection threshold over the one or more successive frames of the received signal as a function of the signal energy calculated in each frame.

36. (New) The method of claim 36 wherein adapting the adaptive ringback detection threshold comprises calculating a current ringback detection threshold based on the calculated signal energy and selecting one of the current ringback detection threshold and a previous ringback detection threshold based on a comparison between the current ringback detection threshold and the previous ringback detection threshold to adapt the adaptive ringback detection threshold.

37. (New) The method of claim 36 wherein calculating the current ringback detection threshold comprises:
filtering said calculated signal energy to determine a filtered energy;
filtering said previous ringback detection threshold to determine a filtered threshold; and
combining said filtered energy and said filtered threshold to calculate the current ringback detection threshold.